USGS

WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: 2003CA35B

Title: Structure and seasonal changes of nematode communities from vernal pools (Santa Rosa Plateau)

Project Type: Research

Focus Categories: Ecology, Wetlands

Keywords: bioassessment, biodiversity, ecology, ephemeral pools survey, Southern California

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Federal Funds Requested: $18542.00

Matching Funds: $23523.00

Congressional District: 44

Principal Investigators: De Ley, Paul (UC Riverside)

Abstract: EXECUTIVE SUMMARY

California’s vernal pools are ephemeral wetlands that constitute biologically diverse and unique ecosystems. They provide habitats for a wide range of highly adapted organisms not or hardly found elsewhere, including twenty-seven species of special concern listed by the U.S. Fish and Wildlife Service. They also function as feeding grounds for migratory birds and other animals of wider distribution. In hydrological terms, vernal pool basins have dampening effects on surface flows and subsurface water level fluctuations. Human activities have already eliminated the large majority of vernal pools in California, and the remaining pools are therefore the subject of a dedicated Recovery Plan by the U.S. Fish and Wildlife Service. One of the specific Recovery Tasks listed in the Recovery Plan, is to inventory each pool within each remaining complex in terms of species diversity and abundance. We therefore propose to conduct an exploratory survey of nematodes in two pools from the Santa Rosa Plateau Ecological Reserve. Nematodes or roundworms are an extremely diverse group of invertebrate animals. They include many microscopic species, and often dominate soils and sediments in numbers and diversity. Their ecological roles and interactions with other organisms are manifold, including for example regulation of decomposers such as bacteria and fungi, but also predation on other small

organisms, parasitism of a wide range of plants and animals, and source of food to many kinds of other animals in soils and sediments. Despite this ecological importance, nematodes are poorly known because of their sheer abundance often exceeds the means of routine research projects, and because their variable morphological appearance often defies accurate identification. The proposed study would not only constitute the first survey of nematodes from vernal pools in the world, but would also apply a novel combination of microscopy and molecular analysis, to identify species and quantify their abundance. The employed methods would result in the construction of a first database of diagnostic DNA sequences, as well as a library of reference video recordings at high magnification of the morphology of the discovered nematodes. Both resources would provide an essential baseline for future surveys of longer duration an expanded geographical scope. Because of the wide range of ecological requirements and behaviours exhibited by nematodes, the resulting data on abundance and diversity of nematodes are expected to reveal correlations with important environmental parameters.They may therefore rove to be directly relevant to bioassessment of ecosystem health of vernal pools, as well as to the monitoring of the general effects of annual climate fluctuations, and the specific consequences of disturbances due to pollution or changes in land use on the Santa Rosa Plateau. Given the current lack of knowledge on nematodes from this habitat, we also expect to discover new species. None of these is likely to qualify for special status in terms of regulatory protection, but it is possible that some will be useful as bioindicator organisms for specific changes or disturbances in vernal pools. In addition to output of scientific data and possible monitoring tools, the project would also provide the setting for the training of two undergraduate students in the many scientific skills involved.
